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United States Patent  
Schulze6,813,987  
November 9, 2004

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 Appl. No.: 049769  
 Filed: September 26, 2002  
 PCT Filed: July 31, 2000  
 PCT NO: PCT/EP00/07368  
 PCT PUB.NO.: WO01/12995

Suppl. 9  
(to USPTO)

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532 us patents

translated from DE

Parent Case Text

## CROSS REFERENCE TO RELATED APPLICATION

This application is a national stage of PCT/EP00/07368 filed Jul. 31, 2000 and based upon DE 199 38 132.1 filed Aug. 16, 1999 under the International Convention.

## Claims

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the same formulation but fantastically  
 longer and much more complex by experienced  
 USPTO specialised Attorney Firm

What is claimed is:

1. Electrohydraulic monitoring device (10) for a dual acting hydraulic cylinder (11), which can be used in two alternative deflected configurations of its cylinder piston and its cylinder housing according to different functions by the alternative application and relief of pressure in two pressure spaces (19, 21) separated from each other by the cylinder piston, wherein for safety reasons it is necessary to maintain a defined operating pressure, for the presetting of which a pressure reduction valve (38) is provided, by means of which, from a high starting pressure of a pressure supply aggregate, a defined pressure can be derived and coupled into the appropriate pressure space for the respective function of the hydraulic cylinder (11), which pressure is preset by adjusting the pretension of a valve spring (41) by means of a spindle drive, which is provided in a spring space (137) which is under the pressure of hydraulic oil flowing out of the hydraulic system, which at its end is bordered or surrounded axially moveably by a control jacket (46), which is axially slideable within a limited axial stroke range (a) between alternative end positions demarked by abutment with housing elements, which are associated with the alternative switch positions of a switch (117) provided in an oil free housing space (122), which is operable by an adjoining element (118) moveably coupled with the control jacket, wherein for determination of the respective operating pressures coupled to the hydraulic cylinder two axially moveable sensor chambers are provided bordered by two sensor pistons (106, 107), each one respectively in communication with a pressure space (19, 21) of the cylinder, by which alternative application and relief of pressure the control jacket respectively is urged into the same end position with which one of the two switch positions of the electrical switch (117) is associated, characterized by the following characteristics: a) the sensor piston is in the form of a ring piston, which radially outwardly is sealed against the central through-going bore (51) of a housing block (52) of the monitoring device (10) and radially inwardly is sealed against the outer jacket surface (102) of a slide guide pipe (66), which is sealed with a radial end flange (78) at the end segment of the bore (51) opposite to the spring (41) and secured against axial sliding relative to the housing block (52); b) the control jacket (46) is in the form of a cylindrical pot; with its base directed towards the spring (41) and its jacket guided axially slideable in the central bore (51), with its jacket segment (49') facing towards the adjacent sensor piston (106), against which in the bore associated ring surface (77) the sensor piston (106) is axially supportable; the length of its axial deflection stroke (a) possible between the end position is marked by the abutment effect of a radial ring flange (56) of the control jacket with an oppositely arranged ring shaped housing side end surface (58 and 59), whereby the jacket is secured against rotation, c) the threaded spindle (47) extends as a projection from a base side of a cylindrical pot-shaped guide jacket (62) mounted axially slideable and rotatable within the jacket of the control casing (46), and is guided in a through-going threaded bore (44) of a base (56) which provides the function of a spindle nut for the control casing (46) employed as spindle drive and engages with its free end centrally with an axially moveable spring plate (42) used for compressing the valve spring (41); d) a control shaft is rotatably mounted centrally in the slide guide pipe (66), which has a projection (69) extending axially into the slide guide casing, which is provided with a radial coupling element (71) for rotation form-fitting coupling of the slide guide casing with the control shaft; e) the internal space bordered by the control jacket (46) within the central bore (51) and the radial extending housing space (133), within which the radial outer flange (57) of the control casing is provided, is in communicating connection with the valve spring (41) and the spring plate (42) containing housing space (137); f) the actuating element (118) of the micro-switch (117) is in the form of a slender pin, which extends through a bore (128) of the housing block (52) extending between the oil free receiving space of the micro-switch (117) and the ring space (133) receiving the radial outer flange (57) of the control casing (56), of which the central axis (127) runs parallel to the central longitudinal axis (54) of the housing (52, 48), is guided gliding and sealed against this bore (128) and by form fitting engagement with an anchor head (136) is moveably coupled with the anchor nut (134) of the ring flange (57) of the control casing (46) is coupled fixed for pulling and pushing therewith.

2. Monitoring device according to claim 1, wherein the through-bore (128) of the housing block (52) extending between the oil free receiving space

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